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10/693,914	10/28/2003	Takaharu Kondo	03500.017666	3968

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EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT	PAPER NUMBER
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1753

MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/693,914

Applicant(s)

KONDO ET AL.

Examiner

Jeffrey T. Barton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 10-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :20040329, 20040514, 20060119, 20060711, and 20070416.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, Species A in the reply filed on 12 June 2007 is acknowledged. The traversal is on the ground(s) that there would not be undue burden involved in examining the claims of Group II with the elected claims. This is not found persuasive because the limitations of the respective groups bear nearly no relationship to each other. The searches would be based on entirely different criteria, and therefore would involve serious burden on the examiner.

The requirement is still deemed proper and is therefore made FINAL.

Claims 1-9 are considered to correspond to the elected species involving specified angles of inclination. Accordingly, claims 10-21 are withdrawn from consideration as being drawn to a nonelected invention.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The wording of the claims is generally unclear to the point of making the scope of the claims indefinite. Specific instances are noted below. Applicant's assistance in correcting any other instances of unclear language is requested.

In claim 1 at line 6, "texture constituents" is recited, although "texture constituents" was recited earlier at lines 2-3 of the claim. It is not clear whether the same texture constituents are being referred to. Also, in claim 1 at lines 8-12, two ranges are recited in a verbose and unclear manner. It is suggested that lines 5-13 of the claims be reworded to read:

"second surface along one curved line, wherein;
the first surfaces have an average angle of inclination within the range of 30 to 60 degrees and the second surfaces have an average angle of inclination within the range of 10 to 35 degrees for at least half of the plurality of texture constituents."

The claim is treated herein as though it was so worded, since these appear to be the limitations intended by Applicant. These grounds of rejection also apply to claims 2-9.

The wording of claim 4 is extremely unclear. It appears Applicant intended the claim to read, "The zinc oxide film according to claim 2, wherein at least half of the plurality of hills have angles of inclination of the first surfaces that are larger than the angles of inclination of the second surfaces." The claim is treated as such herein, and amendment of the claim along these lines is suggested.

At line 2 of claim 5, "hills" is recited, although "hills" was recited earlier. (Claim 1, line 3) It is not clear that the same "hills" are being referred to. In addition, it is not clear what "the plurality of texture" means at line 5 of the claim. Rewording of the claim to read, "The zinc oxide film according to claim 2, wherein the projected area of the first surface on the substrate is smaller than the projected area of the second surface on the substrate for at least half of the plurality of hills." is recommended.

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Claim 6 includes a verbose and unclear range recitation at lines 3-5. The portion reading, "from 800 nm or more to 10 μ m or less" should be amended to read "from 800 nm to 10 μ m". In addition, "texture constituents" is recited at lines 3-4 of the claim, and it is unclear whether these are the same texture constituents recited earlier in the claim. There is no antecedent basis for "the whole texture constituents" in line 6 of the claim. On what projection is Applicant basing the range limitation – is it the projection of the entire crystallite grain, which can be considered to be "the texture constituent", or merely the hill section that protrudes from the bulk film? This is not clear from the wording of the claim. Either projection is considered to meet the limitation in the rejections below.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arao et al. (US 6,238,808)

With respect to claim 1, Arao et al disclose a zinc oxide film formed on a substrate, having a plurality of texture constituents comprised of a plurality of hills each having first and second surfaces bordering each other along a curved line, as claimed. (Figures 5-10) Arao et al disclose that the c-axis of the ZnO grains can be at angles of 15° up to 40° from the substrate normal (Column 17, lines 63-66; Claim 1; Examples up to 24°), which corresponds to an angle of 50-75 ° relative to the plane of the substrate. This overlaps the range of 30-60° for the angle of inclination of the first surface. Arao et al also disclose that the c-axis of the grains is normal to the facets of the grains in the ZnO films. (Column 5, lines 35-36) With the facets thus disposed at 90° from the first

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surface, it follows that these facets will be at angles 15-40 ° from the plane of the substrate, which likewise overlaps the claimed range for angle of inclination of the second surface.

Arao et al do not explicitly disclose the c-axis of the grains of their films being at an angle of 30-35° from normal to the substrate.

However, because Arao et al teach c-axis angles of over 15° from the substrate normal (Claim 1) and further teach that c-axis angles of up to 40° from normal are obtained (Column 17, lines 63-66), it is clearly within the scope of the disclosure, and would have been obvious to one having ordinary skill in the art to prepare ZnO films having c-axis angles of 30-35° from substrate normal, or 55-60° from the plane of the substrate. Since the facets of the grains are normal to the c-axis (Column 5, lines 35-36), the second surface will be at an angle of 30-35° from the plane of the substrate, thus meeting the limitations of the claim.

With respect to claim 2, Arao et al disclose a curved first surface (i.e. the surface parallel to the c-axis) and a planar second surface. (Figures 5-10; Column 5, lines 31-43)

With respect to claim 3, Arao et al disclose the c-axis being normal to the facets of the crystal grains. (Column 5, lines 35-36) This facet corresponds to the (0002) plane of zinc oxide.

With respect to claim 4, as the majority of the crystals grown under given conditions will be at similar angles, in a sample having c-axes disposed at an average angle of inclination of 55-60° with the second surface at 30-35°, this limitation is met.

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With respect to claim 5, the projected areas of the lower-angle surfaces will clearly be greater than those of the higher-angle surfaces.

With respect to claim 6, the maximum dimension of the grains shown, e.g. in Figures 7A and 7B of Arao et al is on the order of 1-2 micrometers, and is clearly over 800 nm and less than 10 micrometers for over 80% of the hills. In addition, grain sizes of up to 1.2 micrometers are disclosed as preferred. (Column 19, lines 1-16)

With respect to claims 7 and 8, no particular weight can be given to limitations directed solely to the way in which the product is made, except insofar as it defines structure. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) However, Arao et al do disclose depositing the zinc oxide film by electrodeposition from an aqueous solution onto a substrate having a sputtered zinc oxide film, precisely as claimed. (Column 6, lines 41-64)

With respect to claim 9, Arao et al disclose a photovoltaic device having a semiconductor film superposed on the zinc oxide films. (Abstract)

In addition, it appears the methods used to make the films of Arao et al are substantially the same as those disclosed in the instant application as suitable for making the claimed zinc oxide films. Compare column 6, lines 41-64 and column 5,

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lines 23-30 of Arao et al with page 53, line 3 – page 56, line 22 of the instant specification. The resulting films likewise have the same or similar appearance when imaged by SEM. (Compare Figures 5-10 of Arao et al with instant Figures 8 and 9) Accordingly, in the absence of evidence to the contrary, the films produced by these methods must be considered to be at least similar enough to render the instant films unpatentable, as the only differences would appear to be matters of optimization, within the level of ordinary skill in the art. Note MPEP 2144.05.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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JTB
22 August 2007



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